Qi Heng HO Email: qi.ho@colorado.edu

Education

2020–Present PhD in Aerospace Engineering Sciences (Autonomous Systems)
Advised by Zachary Sunberg and Morteza Lahijanian
University of Colorado Boulder

2020–2023 M.S. in Aerospace Engineering Sciences (Autonomous Systems)
University of Colorado Boulder

2015–2019 B.Eng Mechanical Engineering (Honours with Distinction)
National University of Singapore

Appointments

2020–Present Graduate Research Assistant, Autonomous Systems, University of Colorado Boulder
2022-2022 Graduate Teaching Fellow, Decision Making Under Uncertainty Course, University of Colorado Boulder
2019-2020 Research Engineer, Autonomy Group, Singapore-MIT Alliance for Research and Technology (SMART) Centre
2018 Singapore-MIT Undergraduate Research Fellow, SMART Centre
2017 Research and Development Intern, Sivantos Group

Research Projects

2020–Present **Fast Planning under Uncertainty for Complex Tasks**
PI: Zachary Sunberg and Morteza Lahijanian

- Sampling-based planning algorithms for Gaussian POMDPs and Non-deterministic Hybrid Systems.
- Algorithms for cost and temporal logic constrained POMDPs.
- Planning with temporal logics (Linear Temporal Logic, Signal Temporal Logic).

2018–2021 **Behavior, Context and Intention Aware Planning under Uncertainty for Urban Driving**
PI: Marcelo H. Ang Jr., Daniela Rus , David Hsu, Malika Meghjani

- Worked on online POMDP planning under uncertainty.
- Developed driver behaviour inference algorithms for self-driving car POMDP planning.
- Developed a novel context and intention-based state transition model.
- Validated algorithms on a self-driving car on public roads.

2018 **Singapore-MIT Undergraduate Research Fellowship: Technologies of Autonomy**
PI: Daniela Rus, Singapore-MIT Alliance for Research and Technology

- Developed mobile robot utilising vision-based SLAM and object detection for socially-aware navigation in crowded spaces.

2018 **String stability of vehicle platoons**

PI: Johan Lofberg, Linköping University

- Developed prototypes and validated various control strategies.

2017 **Nanosatellite Development - Galassia 2**
PI: Luo Sha
Innovation and Design Centric Programme, National University of Singapore

- Helped in development of remote agricultural imaging 3U Cubesat, Galassia 2 (launched in 2023)

Selected Honors and Awards

2023	Young NUS Fellow (NUS Development Grant)
2023	CU Boulder Graduate School Student Travel Grant
2020	Dean's Graduate Assistantship
2020	AES Departmental Fellowship
2019	NUS Faculty of Engineering Innovation and Research Award (Silver)
2018	Singapore-MIT Undergraduate Research Fellowship
2018	NUS Awards for Studying Abroad - NASA Exchange Scholarship

Publications

Preprints/Under Review (* denotes equal contribution)

1. **Qi Heng Ho***, Tyler Becker*, Benjamin Kraske, Zakariya Laouar, Martin Feather, Federico Rossi, Zachary Sunberg, and Morteza Lahijanian, "Recursively-Constrained Partially Observable Markov Decision Processes". (Under Review)
2. **Qi Heng Ho**, Zachary Sunberg, and Morteza Lahijanian, "Sampling-based Reactive Synthesis for Nondeterministic Hybrid Systems". (Under Review)
3. Zakariya Laouar, Rayan Mazouz, Tyler Becker, **Qi Heng Ho**, and Zachary Sunberg, "Safe Feasibility-Guided MPC for Stochastic Hybrid Systems". (Under Review)

Peer Reviewed Publications (* denotes equal contribution)

1. **Qi Heng Ho**, Zachary Sunberg, and Morteza Lahijanian. "Planning with SiMBA: Motion Planning under Uncertainty for Temporal Goals using Simplified Belief Guides". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2023 (Acceptance rate 43%).
2. Anne Theurkauf, **Qi Heng Ho**, Roland Ilyes, Nisar Ahmed, and Morteza Lahijanian. "Chance-Constrained Motion Planning with Event-Triggered Estimation". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2023 (Acceptance rate 43%).
3. Roland Ilyes, **Qi Heng Ho**, and Morteza Lahijanian. "Stochastic Robustness Interval for Motion Planning with Signal Temporal Logic". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2023 (Acceptance rate 43%).
4. **Qi Heng Ho**, Roland Ilyes, Zachary Sunberg, and Morteza Lahijanian. 2023. Poster Abstract: Sampling-based Approach to Robust STL Synthesis for Complex Systems under Uncertainty. In Proceedings of the 26th ACM International Conference on Hybrid Systems: Computation and Control (**HSCC**), 2023.

5. **Qi Heng Ho**, Roland Ilyes, Zachary Sunberg, and Morteza Lahijanian. "Automaton-Guided Control Synthesis for Signal Temporal Logic Specifications". In IEEE Conference on Decision and Control (**CDC**), 2022.
6. **Qi Heng Ho**, Zachary Sunberg, and Morteza Lahijanian, "Gaussian Belief Trees for Chance Constrained Asymptotically Optimal Motion Planning". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2022 (Acceptance rate 43%).
7. Yuanfu Luo*, Malika Meghjani*, **Qi Heng Ho***, David Hsu, Daniela Rus. "Interactive Planning for Autonomous Urban Driving in Adversarial Scenarios". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2021 (Acceptance rate 48%).
8. Hongliang Guo, Zefan Huang, **Qi Heng Ho**, Marcelo Ang, and Daniela Rus. "Autonomous Navigation in Dynamic Environments with Multi-Modal Perception Uncertainties". In IEEE Int. Conf. on Robotics and Automation (**ICRA**), 2021 (Acceptance Rate: 48%).
9. Malika Meghjani, Yuanfu Luo, **Qi Heng Ho**, Panpan Cai, Shashwat Verma, Daniela Rus, and David Hsu. "Context and Intention Aware Planning for Urban Driving". In IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (**IROS**), 2019 (Acceptance rate 45%).
10. Malika Meghjani, Shashwat Verma, You Hong Eng, **Qi Heng Ho**, Daniela Rus and Marcelo H. Ang Jr. "Context-Aware Intention and Trajectory Prediction for Urban Driving Environment". In IFRR Int. Symposium on Experimental Robotics (**ISER**), 2018.

Lightly Reviewed Papers

1. **Qi Heng Ho**, Zachary Sunberg, and Morteza Lahijanian, "Gaussian Belief Trees for Probabilistic Signal Temporal Logic Planning", Robotics Science and Systems (**RSS**) Workshop on Risk Aware Decision Making: From Optimal Control to Reinforcement Learning, 2022.

Talks

- NASA Jet Propulsion Lab (JPL), Maritime and Multi-Agent Autonomy, Sep. 2023.
- Georgia Institute of Technology, FACTS Lab, June 2023.
- University of Colorado Boulder, Robotics Summer Student Seminar, July 2022.

Academic Service and Outreach

Organizer	RSS 2023 Workshop on Inference and Decision Making for Autonomous Vehicles (IDMAV).
Reviewer	CDC, IROS, ICRA, RA-L, AAAI FSS.
2022-2023	Mentor for Boulder Valley High School student on a high school research project.